1852MNRAS..13...40N

always under less advantageous circumstances than on the night of January 9. On former evenings, the contour only of the globe appeared, by momentary glimpses, to penetrate through the obscure ring; whereas, on January 9th, the appearance was such as to convey the idea that it was not merely the outline, but the whole surface traversed by the dark ring, which was visible through it.

"From observations last autumn, I had considered it very probable that the continuation of the outline of the ball through the obscure ring was an optical illusion, arising from the impression made upon the eye by the brightness of the ball in comparison with that of the ring; and though I conceive this explanation should not be hastily set aside, the results of the favourable examination on January 9th have rather shaken my confidence in it: the dark ring on this night certainly appeared to possess a *partial transparency*, which would account for the contour of the globe being perceptible up to the interior bright ring. It was impossible not to remark the much lighter (greyish) shade presented by the projection of the obscure ring upon the ball, as compared with the black shadow of the latter upon the further side of the bright rings.

"*South Villa Observatory, Jan.* 13, 1853."

Some Remarks on the probable present Condition of the Planets Jupiter and Saturn, in reference to Temperature, &c. By Mr. Nasmyth.

"The remarkable appearances which characterise the aspect of the planets *Jupiter* and *Saturn*, as revealed by the aid of very powerful and excellent telescopes, have induced some reflections on the subject of their probable present condition as to temperature, that with a view to excite more special and careful observation of the phenomenon in question, and promote some discussion on this interesting subject, I have been tempted to hazard the following remarks, which may perhaps prove acceptable to some of the members of the Royal Astronomical Society.

"In a former communication, in reference to the structure and condition of the lunar surface, I made some remarks on the principle which, as it appears to me, gives the law to the comparative rate of cooling of the masses of the planets, namely, that while the heat-retaining quality was due to the mass of the planet, the heat-dispensing quality was due or governed by its surface; and as the former increases as the cube of the diameter of the planet, while the latter increases only as the square of its diameter, we thus find that the length of time which would be required by such enormous planets as *Jupiter* and *Saturn* to cool down from their original molten and incandescent condition to such a temperature as would be fitted to permit their oceanic matter to permanently descend and rest upon their surface, would be vastly greater than in the case of such a planet as the earth.

1852MNRAS..13...40N

"Adopting the results which geological research has so clearly established as respects the original molten condition of the earth, as our guide to a knowledge of the condition of all the other planets, it appears to me that we may in this way be led to some very remarkable and interesting conclusions in reference to the probable present condition of such enormous planets as *Jupiter* and *Saturn*, as may tend to explain certain phenomena in respect to their aspect.

"Assuming as established the original molten condition of the earth, and going very far back into the remote and formative periods of the earth's geological history, we may find glimpses of the cause of those tremendous deluges, of which geological phenomena afford such striking evidence, and by whose peculiar dissolving and disintegrating action on the igneous formations which at that early period of the earth's history must have formed the only material of its crust, we may in that respect obtain some insight into the source whence the material which formed the first sedimentary strata was derived. If we only carry our minds back to that early period of the earth's geological history, where the temperature of its surface was so high as that no water in its *fluid* form could rest upon it, and follow its condition from such non-oceanic state to that period at which, by reason of the comparatively cooled-down condition of its surface, it began to be visited by partial and transient descents of the ocean, which had till then existed only in the form of a vast vapour envelope to the earth, we shall find in such considerations, not only the most sublime subject of reflection in reference to the primitive condition of the earth, but also, as it appears to me, a very legitimate basis on which to rest our speculations in regard to the probable present condition of *Jupiter* and *Saturn*,—both of which great planets, I strongly incline to consider, for the reasons before stated, are yet in so hot a condition, as not only not to permit of the permanent descent of their oceanic matter, but to cause such to exist suspended as a vast vapour envelope, subject to incessant disturbances by reason of the abortive attempts which such vapour envelope may make in temporary and partial descents upon the hissing-hot surface of the planet.

"Recurring again to this early period of the earth's geological history, when it was surrounded with a vast vapour envelope, consisting of all the water which now forms the ocean, the exterior portion of this vapour envelope must, by reason of the radiation of its heat into space, have been continually descending in the form of deluges of hot water upon the red-hot surface of the earth. Such an action as this must have produced atmospheric commotions of the most fearful character; and towards the latter days of this state of things, when considerable portions of what was afterwards to form our ocean came down in torrents of water upon the then thin solid crust of the earth, the sudden contraction which such transient visits of the ocean must have produced on the crust of the earth would be followed by tremendous contortions of its surface, and belchings forth of the yet molten matter beneath, such

1852MNRAS..13...40N

as yields legitimate material for the imagination, and the most sublime subject for reflection. The extraordinary contortions and confusion into which the more primitive sedimentary strata, such as the gneiss, schist, and mica slate, are found to have in so very indistinct degree, shadow forth the state of things which must have existed during that period, when the ocean held a very disputed residence on the surface of the earth.

"Could the surface of the earth have been viewed at that era of its geological history from such a distance as the planet *Mars*, I doubt not it would have yielded an aspect in no very dissimilar respect to that which we now observe in the case of *Jupiter:* namely, that while the actual body of the earth would have been hid by the vast vapour envelope then surrounding it, the tremendous convulsions going on within this veil would have been indicated by streaks and disruptions in the belts; and those, again, mottled over with markings, such as we observe in the case of the entire surface of *Jupiter:* and by reason of the belchings forth of the monstrous volcanoes which at that period must have been so tremendously active on the earth, the vapour envelope would be most probably marked here and there with just such dingy and black-and-white patches, as form so remarkable features about the equatoreal region of *Jupiter*—probably the result of volcanic matter, such as ashes, &c.—which the several volcanoes may from time to time vomit forth, and send so far up into its cloudy atmosphere as to appear on the exteriors, and so cause those remarkable features which so often manifest themselves on the exterior of his vapour envelope; for I doubt if we have ever seen the body of *Jupiter* yet, which will probably remain veiled from mortal eyes for countless ages to come, or until he be so cooled down as to permit of a permanent residuum on his surface of his ocean that is to be.

"In applying these views to *Saturn*, it occurs to me that we may in that respect obtain some glimpse into the nature of those causes which have induced, and are now apparently inducing, those changes in respect to the aspect of his rings, which have, more especially of late, attracted so much attention. If he also be so hot, that his future ocean is also suspended as a vast vapour envelope around him, it is possible, I conceive, that some portion of this vapour may migrate, by reason of the peculiar electrical conditions which it is probable his rings may be in, in respect to the body of the planet; and that such migration of vapour in an intensely frozen state, as it must be in such situation, may not only appear from time to time, as the present *phantom ring* does, but also encrust the inner portion of the inner old ring with such coatings of hoar-frost, like crystallised water, as to cause the remarkable whiteness which so peculiarly distinguishes that portion of his rings. Such, in fact, are the extraordinary phenomena of this planet, that one is led to hazard a conjecture or two on the subject; and, I trust, such as I have now the pleasure to offer may have a kind reception from the Royal Astronomical Society.

"*January* 13, 1853."